Science 30 - Unit B - Neutralization Titration QUICK LAB

Name: ___________________________________

Background Information:

1. Discuss the theory of titration. How and why do they work? Use a diagram in your explanation.

Problem:

Objective 1: to titrate an acetic acid solution with standardized 0.5M NaOH

Objective 2: to utilize the titration results to calculate the molarity of acetic acid

Diagram:

Draw the set up for a titration labeling all parts including acids and bases

Materials and Procedure:

Part 1 – Determining the molarity of an Unknown acid.

1. Follow along with your teacher.

Part 2 – Determining the molarity of vinegar

1. Obtain approximately 50 mL of white vinegar and about 100mL standardized NaOH. Record the exact molarity of NaOH.
2. Using a graduated cylinder, transfer 10.0mL of vinegar solution into a 250mL Erlenmeyer flask
3. Add 3 drops of phenolphthalein
4. Rinse the clean buret with approximately 15 mL of NaOH solution and drain into a waste beaker. (as shown by the teacher)
5. Fill the buret with NaOH and note the initial volume of NaOH.
6. Gradually dispense some of the standardized NaOH solution into the flask, swirling constantly. Continue adding NaOH solution, watching the contents of the flask for color change.
7. As the equivalence point approaches, a pinkish color is evident, which initially disappears with swirling. At this point, add NaOH drop by drop rinsing the flask each time and swirling. Stop the titration and take the reading on the buret when the solution remains pale pink for approximately 30 seconds. (try to find the faintest pink possible)
8. Repeat steps 2-7 at least 2 more times. If the values differ widely, it would be a good idea to do one more titration. You must obtain 3 titrations within 0.2mL of each other.

Experimental Results:

Part 1: ____

Molarity of NaOH = __________	**Trial 1**	**Trial 2**	**Trial 3**	**Trial 4**	**Trial 5**
Initial Buret Reading (mL)					
Final Buret Reading (mL)					
Volume of NaOH used (v_f-v_i)					
Colour at Endpoint					
Average volume of NaOH (mL)					

Part 2: ____

Molarity of NaOH = ________	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Initial Buret Reading (mL)					
Final Buret Reading (mL)					
Volume of NaOH used (v_f-v_i)					
Colour at Endpoint					
Average volume of NaOH (mL)					

Calculations:

1. Write out the balanced formula equation for the titration reaction of HCl with NaOH

2. Write out the balanced formula equation for the titration reaction of acetic acid with NaOH

3. Calculate the molarity of CH_3COOH

4. While doing a titration, it is permissible to use a wash bottle to wash down any materials that may have splashed higher up the flask. This would appear to increase the volume of acid in the flask. Why will it have no effect on the results? (1 mark)

5. What was the reason for rinsing out the buret with NaOH solution before starting titrations? (1 mark)

6. By law, vinegar must be no less than 0.833 M acetic acid. Did your sample meet this specification? (1 mark)

7. The actual value (concentration) of HCl was 0.175M. Compare your calculated HCl value by finding %error (2 marks)

$$\%error = \frac{Theoretical - Experimental}{Theoretical} \times 100\%$$

8. Completely describe 3 possible errors that may have influenced your results (6 marks)
   a. State reasons your number may have been off the true value.
   b. Discuss how your errors affected your results
   c. State scientific ways to fix your errors (not change in behaviour)

Error	**Effect on RESULTS of the Lab**	**SCIENTIFIC Fix to the Error**